

**What is Claimed:**

1. A heat exchanger for use with an electronic heat pump, said heat exchanger comprising:  
a thermally conductive base having a first surface and a second surface, said first surface being adapted to make intimate surface contact with a surface of said electronic heat pump;  
a thermally conductive cover spaced from said base;  
a plurality of thermally conductive walls of thickness T between said base and said cover;  
a plurality of narrow channels defined between adjacent walls, said base and said cover through which a heat transfer liquid flows when said heat exchanger is in use;  
wherein each narrow channel has a width W, an inlet end, and an outlet end, and;  
wherein the minimum number of channels/meter N is defined by the approximation:

$$N = 314 * W - 13$$

2. A heat exchanger according to claim 1 wherein the height of each narrow channel is less than about 10mm.
3. A heat exchanger according to claim 1 wherein the thermal resistance of said heat exchanger is less than  $0.1^{\circ}\text{C}/\text{W}$  for a 40mm heat exchanger width.
4. A heat exchanger for use with an electronic heat pump, said heat exchanger comprising:  
a thermally conductive base having a first surface and a second surface, said first surface being adapted to make intimate surface contact with a surface of said electronic heat pump;  
a thermally conductive cover spaced from said base;  
a plurality of thermally conductive walls of thickness T between said base and said cover;  
a plurality of narrow channels defined between adjacent walls, said base and said cover through which a heat transfer liquid flows when said heat exchanger is in use;  
wherein each narrow channel has a width W, an inlet end and an outlet end, and;  
wherein the minimum thickness M(mm) of each wall is defined by the approximation:

$$M = 0.6 * W - 0.3 * W^2$$

5. A heat exchanger according to claim 4 wherein the height of each narrow channel is less than about 10mm.
6. A heat exchanger according to claim 4 wherein the thermal resistance of said heat exchanger is less than  $0.1^{\circ}\text{C}/\text{W}$  for a 40mm heat exchanger width.
7. A heat exchanger for use with an electronic heat pump, said heat exchanger comprising:  
a thermally conductive base having a first surface and a second surface, said first surface being adapted to make intimate surface contact with a surface of said electronic heat pump;  
a thermally conductive cover spaced from said base;  
a plurality of thermally conductive walls of thickness T between said base and said cover;  
a plurality of narrow channels defined between adjacent walls, said base and said cover through which a heat transfer liquid flows when said heat exchanger is in use;  
wherein each narrow channel has a width W, an inlet end and an outlet end,  
wherein the minimum number of channels/meter N is defined by the approximation:  
$$N = 314 * W - 13, \text{ and};$$
  
wherein the minimum thickness M(mm) of each wall is defined by the approximation:  
$$M = 0.6 * W - 0.3 * W^2$$
8. A heat exchanger according to claim 7 wherein the height of each narrow channel is less than about 10mm.
9. A heat exchanger according to claim 7 wherein the thermal resistance of said heat exchanger is less than  $0.1^{\circ}\text{C}/\text{W}$  for a 40mm heat exchanger width.
10. A heat exchanger for use with an electronic heat pump, said heat exchanger comprising:  
a thermally conductive base having a first surface and a second surface, said first surface being adapted to make intimate surface contact with a surface of said electronic heat pump;  
a thermally conductive cover spaced from said base;

a plurality of thermally conductive walls of thickness T between said base and said cover;  
a plurality of narrow channels defined between adjacent walls, said base and said cover  
through which a heat transfer liquid flows when said heat exchanger is in use;  
wherein each narrow channel has a width W, an inlet end and an outlet end, and;  
wherein the channel width W(mm) and the minimum number (N) of channels per meter  
are within the following ranges:

W	N
0.05	25
0.1	25
0.2	55
0.3	80
0.4	110
0.5	145
0.6	170
0.7	200
1.0	310

11. A heat exchanger according to claim 10 wherein the height of each narrow channel is less than about 10mm.
12. A heat exchanger according to claim 10 wherein the thermal resistance of said heat exchanger is less than  $0.1^{\circ}\text{C}/\text{W}$  for a 40mm heat exchanger width.
13. A heat exchanger for use with an electronic heat pump, said heat exchanger comprising:  
a thermally conductive base having a first surface and a second surface, said first surface being adapted to make intimate surface contact with a surface of said electronic heat pump;  
a thermally conductive cover spaced from said base;  
a plurality of thermally conductive walls of thickness T between said base and said cover;  
a plurality of narrow channels defined between adjacent walls, said base and said cover  
through which a heat transfer liquid flows when said heat exchanger is in use;  
wherein each narrow channel has a width W, an inlet end and an outlet end, and;

wherein the channel width W(mm) and the minimum wall thickness T(mm) are within the following ranges:

W	T
0.05	0.025
0.1	0.025
0.2	0.05
0.3	0.10
0.4	0.15
0.5	0.175
0.6	0.20
0.7	0.235
1.0	0.25

14. A heat exchanger according to claim 13 wherein the height of each narrow channel is less than about 10mm.
15. A heat exchanger according to claim 13 wherein the thermal resistance of said heat exchanger is less than  $0.1^{\circ}\text{C}/\text{W}$  for a 40mm heat exchanger width.
16. A heat exchanger for use with an electronic heat pump, said heat exchanger comprising:  
a thermally conductive base having a first surface and a second surface, said first surface being adapted to make intimate surface contact with a surface of said electronic heat pump;  
a thermally conductive cover spaced from said base;  
a plurality of thermally conductive walls of thickness T between said base and said cover;  
a plurality of narrow channels defined between adjacent walls, said base and said cover through which a heat transfer liquid flows when said heat exchanger is in use;  
wherein each narrow channel has a width W, an inlet end and an outlet end, and;  
wherein the channel width W(mm) and the minimum wall thickness T(mm) are within the following ranges:

W	T
0.05	0.025
0.1	0.025
0.2	0.05
0.3	0.10
0.4	0.15
0.5	0.175
0.6	0.20
0.7	0.235
1.0	0.25

and wherein the channel width W(mm) and the minimum number (N) of channels per meter are within the following ranges:

W	N
0.05	25
0.1	25
0.2	55
0.3	80
0.4	110
0.5	145
0.6	170
0.7	200
1.0	310

17. A heat exchanger according to claim 16 wherein the height of each narrow channel is less than about 10mm.

18. A heat exchanger according to claim 16 wherein the thermal resistance of said heat exchanger is less than  $0.1^{\circ}\text{C}/\text{W}$  for a 40mm heat exchanger width.